



Structure of the upper mantle beneath POLENET/LAPNET array, northern Fennoscandian Shield, revealed by high-resolution teleseismic P-wave traveltimes tomography

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POLENET/LAPNET project is a passive seismic array experiment in northern Fennoscandia with stations in northern Finland, Sweden, Norway and Russia with the study area extending between 18 – 31 degrees E and 64 – 70 degrees N. One of the major targets of POLENET/LAPNET temporary seismic array research during the International Polar Year 2007-2009 was to obtain a 3D seismic model of the upper mantle in the northern part of the Precambrian Fennoscandian shield. To reach this aim we use a high-resolution teleseismic traveltimes tomography. 3167 arrivals of P-waves from 97 teleseismic events with epicentral distances of 30 – 90 degrees were manually picked and inverted using TELINV code. As the crustal thickness in the study area varies from 40 km to almost 60 km, the traveltimes of P-waves were corrected for the effect of the crust using the crustal velocity model compiled from previous results of controlled-source seismic profiling, P-wave receiver function studies, and seismic noise tomography in the area. The resolution analysis demonstrated that resolution of POLENET/LAPNET data is reasonably good between depths of 75 km and 300 km. The structure of the upper mantle in the northern Fennoscandian Shield revealed in our study is generally different from the structure of the southeastern part of the Fennoscandian Shield revealed by the previous SVEKALAPKO experiment, where a high-velocity lithospheric "keel" was located stretching down to the depth of 300 km. The structure of the upper mantle beneath POLENET/LAPNET array appears to be heterogeneous down to at least 300 km, with a number of positive and negative anomalies relative to the IASP91 standard velocity model.